

Sub C17

1. A communication system comprising:  
a source of energy to propagate a signal along a communication path;  
a detector positioned in the communication path; and  
a filtering system disposed in the optical path, the filtering system having a transform function associated therewith, encode the signal, defining an encoded signal, and decode the encoded signal to retrieve the signal for detection by the detector.
2. The system as recited in claim 1 wherein the filtering system removes unwanted characteristics from the signal with the unwanted characteristics being selected from a group consisting essentially of amplitude, polarization, wavelength and phase.
3. The system as recited in claim 1 wherein the first and second filtering system is a transmissive element, allowing the signal to propagate between opposing surfaces thereof.
4. The system as recited in claim 1 wherein the filtering system is a reflective element, allowing the signal to enter and exit the element through a common surface.
5. The system as recited in claim 1 wherein the signal is an optical signal.
6. The system as recited in claim 1 wherein the signal is an RF signal having a wavelength in the range of in the range of 1 micron to 1 millimeter, inclusive.

1                    10.     The system as recited in claim 1 wherein the filtering system  
2 includes an optical element has opposed sides with a spherical surface being positioned  
3 on one of the opposed sides and a planar surface being disposed on the remaining side of  
4 the opposed sides with the holographic transform function being recorded within a  
5 volume of the lens between the spherical and the planar surfaces.

1           11.     The system as recited in claim 1 wherein the filtering system is an  
2 optical element having opposed sides with a cylindrical surface being positioned on one  
3 of the opposed sides and a planar surface being disposed on the remaining side of the  
4 opposed sides, with the holographic transform function being recorded within a volume  
5 of the lens between the cylindrical and the planar surfaces.

1           12.     The system as recited in claim 1 wherein the filtering system  
2 includes an optical element having opposed sides with a spherical surface being  
3 positioned on one of the opposed sides and a rotary symmetric arrangement of grooves  
4 defining a Fresnel lens being disposed on the remaining side of the opposed sides with  
5 the holographic transform function being recorded within a volume of the lens between  
6 the spherical surface and the Fresnel lens.

1           13.     The system as recited in claim 1 wherein the source of energy  
2 includes an array of optical transmitters to generate optical energy to propagate along a  
3 plurality of axes and the detector includes an array of optical receivers, each of which is  
4 positioned to sense optical energy propagating along one of the plurality of optical axes  
5 and the filtering system includes an array of lenses, each of which is disposed in one of  
6 the plurality of axes and includes the arcuate surface with the holographic transform  
7 being recorded within a volume of the array of lenses.

1           14.     The system as recited in claim 1 wherein the source of optical  
2 energy includes an array of optical transmitters to generate optical energy to propagate  
3 along a plurality of axes and the detector includes an array of optical receivers, each of  
4 which is positioned to sense optical energy propagating along one of the plurality of  
5 optical axes and the filtering system includes a plurality of lenses having the arcuate  
6 surface with holographic transform function recorded within a volume thereof, with the  
7 plurality of lenses being arranged in first and second arrays, the first array being disposed  
8 between the array of optical transmitters and the array of optical receivers and the second  
9 array being disposed between the first array and the optical receivers.

1                    16.        The system as recited in claim 15 wherein the source of optical  
2 energy includes an array of optical transmitters to generate optical energy to propagate  
3 along a plurality of axes and the detector includes an array of optical receivers, each of  
4 which is positioned to sense optical energy propagating along one of the plurality of  
5 optical axes and the filtering system includes an array filtering systems lenses, each of  
6 which includes the first and second filtering apparatuses, disposed in one of the plurality  
7 of axes, with each of the first and second filtering apparatus defining a lens having an  
8 arcuate surface with the transform function being recorded within a volume thereof.

1                     17.     The system as recited in claim 16 wherein the source of optical  
2     energy includes an array of optical transmitters to generate optical energy to propagate  
3     along a plurality of axes and the detector includes an array of optical receivers, each of  
4     which is positioned to sense optical energy propagating along one of the plurality of  
5     optical axes and the optical system including a plurality of lenses having the arcuate  
6     surface with holographic transform function being disposed within a volume thereof, with  
7     the plurality of lenses being arranged in first and second arrays, the first array being  
8     disposed between the array of optical transmitters and the array of optical receivers and  
9     the second array being disposed between the first array and the optical receivers.

1                    19. The system as recited in claim 18 wherein the lenses of the first  
2    and second arrays have a spherical surface and an additional surface disposed opposite to  
3    the spherical surface, with a Fresnel lens being disposed on the additional surface.

1                    20.    The system as recited in claim 18 wherein the lenses of the first  
2    and second arrays have a cylindrical surface and an additional surface disposed opposite  
3    to the cylindrical surface, with a Fresnel lens being disposed on the additional surface.